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Staff Training on the Use of Health Information Systems: What Do We Know?

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Abstract. Staff training is acknowledged as an important activity when implementing health information systems (HISs). This paper reviews the literature on staff training in connection with HIS implementation. The aim is to identify critical issues to reflect on when planning or evaluating this type of training. Searches were conducted in three research databases, resulting in 423 hits. Sixty-four papers were retrieved for more detailed examination, and 12 papers were selected for analysis. The analysis focused on the content, organization and pedagogical approach. In general, the review revealed minor primarily descriptive studies focused on aspects of staff training rather than strategies for staff training. The review revealed specific agreed-upon issues that are considered important for the success of the training. The issues identified are transfer of knowledge and skills is not enough, ongoing training is important, training should be related to practice and address individual learning needs, and super-users are important facilitators.

Keywords. Staff training Health information systems, implementation, adoption

Introduction

Implementing health information systems (HISs) is recognized as a difficult and challenging process. Over the years, there have been many attempts to understand and to identify factors critical for the success or failure of processes for implementing HISs. Characteristic of these efforts is an emphasis on the complex nature of the implementation process, by which an HIS implementation cannot be reduced to a technical process but involves the whole organization. The specific number of identified critical factors and the level of detail differ. For example, in 2003 Ash et al. [1] provided a consensus statement with nine considerations important for Computerized physician order entry (CPOE) implementation: motivation, vision and leadership, costs, integration, value to users, project management, technology, training and support, and ongoing learning and improvement. On a more abstract level, in 2004 Coiera [2] suggested four rules for the reinvention of healthcare: Technical systems have social consequences, social systems have technical consequences, design is not about technology but about socio-technical systems, and designing sociotechnical systems requires an understanding of how people and technologies interact. In line with this, in 2004 Aarts et al. [3] pointed to social studies of science and technology as a

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theoretical frame for understanding the complexity of HIS implementation processes. Their analysis was based on three theoretical assumptions from this framework: Technology and practice are transformed during the implementation process (mutual shaping), implementation is, by nature, unpredictable (emergent change), and success and failure are not static categories but socially negotiated judgments.

These early insights into the complex nature of HIS implementation processes are supported by many later investigations, including investigations based on a synthesis of several studies [4-8], as well as review papers [9-13]. There are differences, of course, in exactly how many critical factors are identified, the specific critical factors and how they are designated. There seemed to be some consensus, however, in categorizing the critical factors in technological, organizational and human and social issues and at the same time emphasizing that the issues are interrelated and that alignment between them is important [9], [10], [13].

Staff training was considered a critical factor; it is one of five identified lessons learned: "Expect the need for multiple methods of training, including the most basic computer skills for novice users" [5], just as "dedication of adequate resources and time for staff training, technical support, and system troubleshooting and maintenance" is mentioned as one out of four critical factors identified in [6], and the need for training and support was one of the main findings from a prospective national evaluation of the implementation of electronic health records in secondary care in England [8]. Adequate training and support, sufficient time for training, technology literacy and general competencies of staff were identified in [13], [10], [9], [11] and placed in the category human or social critical factors for implementing HIS systems. This paper examines literature on staff training on use of an HIS, that is, papers that describe and evaluate specific ways of doing training, how is it organized, pedagogical approach and delivery form, and experiences with this type of staff training.

1. Methods and Materials

The review was carried out as a structured search in three research databases: Medline, Scopus, and Web of Science. Medline is the most specific, whereas the others are broader covering research output in the fields of science, technology, medicine, social sciences, arts and humanities. The search in the databases were structured via search strings of "Health information system" OR "electronic medical record" OR" computerized provider order entry system" OR "clinical care" OR "hospital information system", combined with variations of "implementation" and variations of "staff training" plus "evaluation". The search was limited to the last 10 years, that is, from 2008 until 2017, and to English-language peer-reviewed publications. The search resulted in 423 hits (Medline 196, Web of Science 156, and Scopus 71).

Based on a reading of titles and abstracts, 64 papers were retrieved for more detailed examination, and 12 papers were selected for analysis. These papers include evaluations or descriptions of staff training in connection with HIS implementation. Three papers evaluated different aspects of staff training [14-16], one paper described a transformation of a training strategy [17], seven papers were implementation studies that included some description of aspects of staff training [18-24], and one study described the use of e-learning to educate nurses about new elements incorporated into an existing system [25]. Most papers discussed staff training in connection with implementation and use of electronic medical or health record systems, one focused on

"newly adopted technology in acute care settings" [19] and another on decision support systems [23]. Two studies used a quantitative approach [14], [16], one study used mixed methods [15], three studies were based on the authors' experiences [17], [22], [25] and the rest used a qualitative approach; that is, the findings were based on interviews or observations. Most studies took place in a hospital setting, three specified critical care units [21], [23], [19], one was a mental hospital [18], one focused on a record used by physician providers [15], one study was in the context of nursing homes [20] and one was in ambulatory practice settings [22].The analysis was carried out by reading the selected papers and organizing the papers' findings within the following categories: content (what knowledge and skill), organization (e.g., classroom, online, bedside or learning labs) and the pedagogical approach (e.g., transfer, interactive or practice oriented).

2. Results

In general, the review revealed the studies were minor primarily descriptive studies focused on aspects of staff training rather than actual strategies for staff training. One study differed as it consisted of testing the effectiveness and efficiency of a mandatory hospital program aimed at introducing the digital medical record used at the hospital [14]. The mandatory program was only briefly introduced, however. The review revealed specific agreed-upon ideas and trends in staff education, as well as general challenges. These trends are elaborated in the following sections.

2.1. The traditional way is not enough

Most of the papers were based on a more or less explicit understanding of the traditional way of doing staff training. As formulated in [14]: "This type of training model begins with the assumption that each novice participant starts training at the same knowledge and skill level and that the goal of the training session is to transmit sufficient information for each participant to undertake the required task independently" (p. 408). The traditional model was also described as a "single introductory 'how-to-use-the-new-EHR' class" [16] or as "instructor-led, hands-on training, with a focus on navigating through the electronic charts" [17]. This traditional model was not described in detail although it was addressed in one of the papers as "a compulsory hospital induction and orientation programs for all staff, which include 3,5 h ICT training…a variety of educational styles, including didactic teaching, demonstrations, e-learning and practical application" [14 p. 480]. There seemed to be agreement that this traditional model is not enough and should be augmented and/or changed. One issue addressed in many studies in connection to the traditional model was the importance of timing in staff education [14], [19], [21], [22], which was expressed by [22] as: Training that is either too early or too late will waste resources and raise frustrations.

2.2. Ongoing training is important

Some of the studies focused on or mentioned the need for ongoing training [15], [20], [25]. Software changes over time, and the staff needs to be aware of these changes and know how to use the new or changed functionalities. Another reason for focusing on ongoing training is that introductory training focused more on "gaining basic

proficiency for job functions rather than efficiency and mastery" [15]. Thus, ongoing training can focus on content identified as important and causing trouble for the users and content that supports the staff in using HIS in a professional rewarding way.

2.3. Training should be related to clinical practice and address individual learning needs

The importance of working with real cases (concrete scenarios) focusing on clinical work-flow and using a problem-oriented interactive approach, was emphasized in several papers [15], [16], [17], [20]. In addition, inadequate training was characterized as training not related to clinical practice [18], [23]. One study stressed that it was important to give room and time for staff to set their own pace and establish a learning laboratory where staff could work with specific clinical scenarios [17]. Assessment of computer skills was used in [17] and mentioned in [15] as a way of addressing individual learning needs.

2.4. Super-users are important facilitators

Super-users and related concepts, such as peer coaches, mentors and local champions, were considered important in [16], [19], [20], [21], [24]. In [24], super-users were defined as "clinician[s] or nurses who are capable of training other people, they work on the ward and are very motivated so they act as 'local facilitators' in each department, supporting staff and training new staff." Super-users are colleagues who receive specific training and thus, support the idea that training should be related to clinical practice. The degree of training and the role of super-users vary. Several specific models were described in [21].

3. Conclusion

This paper presented a review of literature on staff training in connection with the implementation and use of health information systems. There is no formula for doing staff training. One size does not fit all. However, the review revealed specific agreed-upon issues that are considered important for successful staff training. These issues can inform the planning or evaluation of staff training.

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